SEI Imaging & Structural Analysis Core

Imaging & Structural Analysis

Core Director(s): William Brunken, PhD, Downstate
Gary Matthews, PhD, Stony Brook
Wendy Akmentin, Stony Brook (structural analysis)

Phone: (718) 221-5328

Location: Downstate Medical Center (www.downstate.edu) and Stony Brook University (www.stonybrook.edu)

Email: william.brunken@downstate.edu

Key functional capabilities of this core are:

(1) Imaging; in vivo imaging of ocular tissues including anterior and posterior chamber, and the posterior pole (retina) using conventional photography and spectral domain OCT;

(2) Computational Support for light and confocal data analysis, including 3D rendering, volume deconvolution of light and confocal data; and

(3) Structural Analysis by electron microscopy (transmission and scanning), including tissue preparation, sectioning, and microscopy.

Instrumentation in Core:

Equipment:

A. **Imaging Laboratories** (housed in a dedicated procedure room in the DMC-DLAR facility).
   a. *Micron III fundus camera*, Phoenix Research Laboratories
   b. Envisu R-2200 spectral domain ophthalmic imaging system. Bioptigen

B. **Computational Support** (housed in the vision research group at DMC).
   a. *Volocity License Server*. This turnkey software acts to organize and provide access to software modules. The server is located on the net and queried for open licenses. There is no physical limitation to the location of the server. Use of a network server system allows for a dramatic reduction in the cost of multiple licenses
   b. *Acquisition.* This software module controls all parameters of image acquisition, including all camera parameters; microscope functions, z-axis, X-Y axes, filter cube selection etc. Thus, z-stacking, X-Y montage, multiple label experiments can be automated and performed at single time points of in time sequence (4D). Plug-ins are available for control FRET, FRAP and other parametric experiments.
   c. *Quantitation.* This software module provides for automated object counting, calculation of object size, area, density, coefficient of co-localization.
   d. *Restoration.* This subroutine includes background correction algorithms as well as more powerful deconvolution based on either measured or calculated point spread functions of either wide-field or confocal data. The out of focus information is discarded.
   e. *Visualization.* This is one of the most powerful of the Volocity sub-routines. It provides for rapid 3D (and 4D) rendering of acquired data. Complete reconstruction of labeled cells, vascular trees, and synaptic structures can be made from optically sectioned material. Data can be exported either as movies with fly-in controls or as static images.

C. **Structural Analysis Laboratory** (housed at SUNY Stony Brook)
   a. *JEOL 1200EX2*, transmission electron microscope goniometer/stage-tilt capability for thin-section stereo images and film cameras
   b. *FEI BioTwinG2* transmission EM with AMT digital camera;
   c. Ultramicrotomes; Microtomes; Knife maker;
   d. *Leica EM-CPC* rapid freezing unit